

UTILITY PATENT APPLICATION TRANSMITTAL (Large Entity)

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Docket No.
13167

Total Pages in this Submission
3

TO THE ASSISTANT COMMISSIONER FOR PATENTS

Box Patent Application
Washington, D.C. 20231

Transmitted herewith for filing under 35 U.S.C. 111(a) and 37 C.F.R. 1.53(b) is a new utility patent application for an invention entitled:

Yoshimasa Hosonuma

and invented by:

FLEXIBLE BOARD AND METHOD OF FABRICATING THE SAME

If a CONTINUATION APPLICATION, check appropriate box and supply the requisite information:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: _____

Which is a:

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Which is a:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: _____

Enclosed are:

Application Elements

1. ☒ Filing fee as calculated and transmitted as described below
2. ☒ Specification having 14 pages and including the following:
 - a. ☐ Descriptive Title of the Invention
 - b. ☐ Cross References to Related Applications (if applicable)
 - c. ☐ Statement Regarding Federally-sponsored Research/Development (if applicable)
 - d. ☐ Reference to Microfiche Appendix (if applicable)
 - e. ☒ Background of the Invention
 - f. ☒ Brief Summary of the Invention
 - g. ☒ Brief Description of the Drawings (if drawings filed)
 - h. ☒ Detailed Description
 - i. ☒ Claim(s) as Classified Below
 - j. ☒ Abstract of the Disclosure

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Application Elements (Continued)

3. ☒ Drawing(s) *(when necessary as prescribed by 35 USC 113)*
- a. ☒ Formal Number of Sheets 4
- b. ☐ Informal Number of Sheets _____
4. ☒ Oath or Declaration
- a. ☒ Newly executed *(original or copy)* ☐ Unexecuted
- b. ☐ Copy from a prior application (37 CFR 1.63(d)) *(for continuation/divisional application only)*
- c. ☒ With Power of Attorney ☐ Without Power of Attorney
- d. ☐ DELETION OF INVENTOR(S)
Signed statement attached deleting inventor(s) named in the prior application,
see 37 C.F.R. 1.63(d)(2) and 1.33(b).
5. ☐ Incorporation By Reference *(usable if Box 4b is checked)*
The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied
under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby
incorporated by reference therein.
6. ☐ Computer Program in Microfiche *(Appendix)*
7. ☐ Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all must be included)*
- a. ☐ Paper Copy
- b. ☐ Computer Readable Copy *(identical to computer copy)*
- c. ☐ Statement Verifying Identical Paper and Computer Readable Copy

Accompanying Application Parts

8. ☒ Assignment Papers *(cover sheet & document(s))*
9. ☐ 37 CFR 3.73(B) Statement *(when there is an assignee)*
10. ☐ English Translation Document *(if applicable)*
11. ☒ Information Disclosure Statement/PTO-1449 ☒ Copies of IDS Citations
12. ☐ Preliminary Amendment
13. ☒ Acknowledgment postcard
14. ☒ Certificate of Mailing
- ☐ First Class ☒ Express Mail *(Specify Label No.):* EM169955190US

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Accompanying Application Parts (Continued)

15. ☒ Certified Copy of Priority Document(s) *(if foreign priority is claimed)*

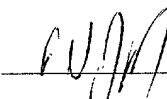
16. ☐ Additional Enclosures *(please identify below):*

Fee Calculation and Transmittal

CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	18	- 20 =	0	x \$18.00	\$0.00
Indep. Claims	3	- 3 =	0	x \$78.00	\$0.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
BASIC FEE					\$760.00
OTHER FEE (specify purpose) <u>Recordation of Assignment</u>					\$40.00
TOTAL FILING FEE					\$800.00

- ☒ A check in the amount of **\$800.00** to cover the filing fee is enclosed.
- ☒ The Commissioner is hereby authorized to charge and credit Deposit Account No. **19-1013/SSMP** as described below. A duplicate copy of this sheet is enclosed.
- ☐ Charge the amount of _____ as filing fee.
- ☒ Credit any overpayment.
- ☒ Charge any additional filing fees required under 37 C.F.R. 1.16 and 1.17.
- ☐ Charge the issue fee set in 37 C.F.R. 1.18 at the mailing of the Notice of Allowance, pursuant to 37 C.F.R. 1.311(b).



Signature

Paul J. Esatto, Jr.
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Dated: November 22, 1999

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CC:

FLEXIBLE BOARD
AND
METHOD OF FABRICATING THE SAME

5 BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The invention relates to a flexible board capable of preventing generation of unnecessary radiation therefrom, a method of fabricating such a flexible board, and a cellular phone including such a flexible board.

10

DESCRIPTION OF THE RELATED ART

A cellular phone has been required to be light in weight, small in size, and thin in thickness. In order to meet such requirement, various parts to be incorporated into a body of a cellular phone are also required to be light, small and thin. In addition, since unnecessary radiation might exert harmful influence on sensitivity of a cellular phone on receiving radio signals, a cellular phone is required not to be influenced by unnecessary radiation.

15

The above-mentioned unnecessary radiation is radiated a lot from a bus line and a clock line among memories and controllers, for instance. If what unnecessary radiation radiates such as the above-mentioned bus line and clock line is formed on a flexible board, it would be quite difficult to prevent unnecessary radiation from radiating from what unnecessary radiation radiates. Hence, only limited kinds of lines are allowed to be formed on a flexible board.

20

In order to avoid this problem, a flexible board has been conventionally designed to have a multi-layered printed structure, and what unnecessary radiation radiates a lot such as a bus line and a clock line has been formed on an internal layer in the multi-layered printed structure to thereby minimize generation of unnecessary radiation therefrom. A line which is likely to be influenced by unnecessary radiation has been conventionally formed also on an

25

internal layer in the multi-layered printed structure.

However, if a bus line and a clock line are to be arranged on an internal layer in the multi-layered printed structure, it would be unavoidable for the multi-layered printed structure to become large in order to ensure a space for arranging those lines. If the multi-layered printed structure is large in size, it would be impossible to incorporate the flexible board into a cellular phone required to be as small as possible.

Japanese Unexamined Patent Publication No. 5-3395 has suggested a flexible printed board including a circuit sandwiched between flexible insulating layers. A shield layer composed of metal and having a thickness equal to or smaller than $5\ \mu\text{m}$ is formed on a surface of one of the flexible insulating layers. A second insulating layer for fixing the shield layer onto the flexible insulating layers is adhered onto both the shield layer and the flexible insulating layers through adhesive layers.

Japanese Unexamined Patent Publication No. 7-111371 has suggested a flexible printed board including a first insulating layer formed at a predetermined location with a first contact hole, a wiring layer, a second insulating layer formed at a predetermined location with a second contact hole, a first electromagnetic shield layer comprised of a third insulating layer and a first electrically conductive layer such that the first electrically conductive layer makes contact with the first insulating layer, the first electromagnetic shield layer being formed with a first through-hole above the first contact hole, the wiring layer and the first electromagnetic shield layer being electrically connected to each other through electrical conductor filled in the first contact hole and the first through hole, an adhesive layer formed around the electrical conductor between the first insulating layer and the first electrically conductive layer, a second electromagnetic shield layer comprised of a fourth insulating layer and a second electrically conductive layer such that the second electrically conductive layer makes contact with the second insulating layer, the second electromagnetic shield

layer being formed with a second through-hole above the second contact hole, the wiring layer and the second electromagnetic shield layer being electrically connected to each other through electrical conductor filled in the second contact hole and the second through hole, and an adhesive layer formed around the electrical conductor between the second insulating layer and the second electrically conductive layer,

Japanese Unexamined Patent Publication No. 8-122806 has suggested a liquid crystal display device having a multi-layered flexible substrate. The suggested liquid crystal display device is comprised of a chip-on-glass type liquid crystal display unit including two transparent insulating substrates overlapping each other, a drive integrated circuit being mounted on one of the transparent insulating substrates, and a multi-layered flexible substrate having three or more electrically conductive layers, electrically connected to an input terminal pattern of the drive integrated circuit, and arranged outside at least on side of the liquid crystal display unit.

Japanese Unexamined Patent Publication No. 9-138388 has suggested a liquid crystal display device including a liquid crystal display unit and a first circuit substrate electrically connected to the liquid crystal display unit. The first circuit substrate partially overlaps the liquid crystal display unit as viewed perpendicularly to the first circuit substrate.

Japanese Unexamined Patent Publication No. 9-197425 has suggested a liquid crystal display device including a liquid crystal display panel, a circuit board for driving liquid crystal, divided into at least two pieces, an electrically conductive layer supported by a substrate layer, and a joiner for electrically connecting the divided circuit boards to each other. The joiner is comprised of a signal layer contributing to electrical connection of the divided circuit boards, and a ground layer.

Japanese Unexamined Patent Publication No. 10-74550 has suggested a liquid crystal display device comprised of a first circuit board, a second circuit

board, and a connector for electrically connecting the first and second circuit boards to each other, an electrical conductor covering an outer surface of the connector. At least one of ground lines or a power supply line of the first and second circuit boards is electrically connected to the electrical conductor.

5 Japanese Unexamined Patent Publication No. 10-133218 has suggested a tape carrier package on which IC chip is mounted. The tape carrier package has a base film at a terminal thereof for preventing scattering, and a wiring is formed on the base film.

10 Japanese Unexamined Patent Publication No. 7-170089 has suggested a flexible printed wiring board comprising a substrate composed of an electrically insulating film and formed at a surface thereof with an electrically conductive path, an electrically insulating layer covering the electrically conductive path therewith, an external layer composed of an electrical conductor having a greater size than that of said electrically conductive path and formed on the electrically
15 insulating layer and the substrate, and couplers extending throughout the substrate to thereby electrically couple the external layers to each other at a location out of the electrically conductive path, the couplers being arranged at a pitch smaller than a predetermined pitch in a direction in which a signal is transmitted.

20

SUMMARY OF THE INVENTION

In view of the above-mentioned problems, it is an object of the present invention to provide a flexible board which is capable of preventing generation of unnecessary radiation therefrom without an increase in size and thickness.

25 It is also an object of the present invention to provide a method of fabricating such a flexible board.

In one aspect of the present invention, there is provided a flexible board including (a) an internal layer, (b) a line formed in a first area of the internal layer, the line radiating unnecessary radiation, (c) a first ground layer formed on an

upper surface of the internal layer, the first ground layer disallowing radiation to pass therethrough, and (d) a second ground layer formed a lower surface of the internal layer, the second ground layer disallowing radiation to pass therethrough.

5 It is preferable that the flexible board further includes (e) a first cover layer formed over a surface of the first ground layer, and (f) a second cover layer formed over a surface of the second ground layer.

 It is preferable that the flexible board further includes electrically insulating adhesive layers sandwiched among the internal layer, the first and
10 second ground layers, and the first and second cover layers.

 It is preferable that the flexible board further includes a ground line formed in a second area except the first area in the internal layer.

 It is preferable that a plurality of through-holes may be formed throughout the first ground layer, the internal layer, and the second ground layer.

15 It is preferable that a plurality of through-holes is formed throughout the first ground layer, the ground line, and the second ground layer, and that the through-holes electrically connects the first ground layer, the ground line, and the second ground layer to one another.

 In another aspect of the present invention, there is provided a method
20 of fabricating a flexible board, including the steps of (a) forming a line in a first area of an internal layer, the line radiating unnecessary radiation, (b) covering an upper surface of the internal layer with a first ground layer which disallows radiation to pass therethrough, and (c) covering a lower surface of the internal layer with a second ground layer which disallows radiation to pass therethrough.

25 It is preferable that the method further includes the steps of (d) covering a surface of the first ground layer with a first cover layer, and (e) covering a surface of the second ground layer with a second cover layer.

 It is preferable that the method further includes the step of forming electrically insulating adhesive layers among the internal layer, the first and

second ground layers, and the first and second cover layers.

It is preferable that the method further includes the step of forming a ground line in a second area except the first area in the internal layer.

It is preferable that the method further includes the step of forming a plurality of through-holes throughout the first ground layer, the internal layer,
5 and the second ground layer.

It is preferable that the method further includes the step of forming a plurality of through-holes throughout the first ground layer, the ground line, and the second ground layer so that the through-holes electrically connect the first
10 ground layer, the ground line, and the second ground layer to one another.

In still another aspect of the present invention, there is provided a cellular phone including such a flexible board as mentioned above.

The advantages obtained by the aforementioned present invention will be described hereinbelow.

In accordance with the present invention, the first and second ground
15 layers and the ground lines prevent radiation of unnecessary radiation from the flexible board and entrance of unnecessary radiation into the flexible board. Hence, it is possible for the flexible board to be harmfully influenced by unnecessary radiation. In addition, since the first and second ground layers and
20 the ground lines are formed planar in the internal layer, the flexible board can have the above-mentioned advantages without an increase in size and thickness.

The above and other objects and advantageous features of the present invention will be made apparent from the following description made with reference to the accompanying drawings, in which like reference characters
25 designate the same or similar parts throughout the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an exploded perspective view of a flexible board in accordance with the embodiment of the present invention.

Fig. 2 is a cross-sectional view of the flexible board illustrated in Fig. 1.

Fig. 3 is a plan view of the internal layer constituting the flexible board illustrated in Fig. 1.

Fig. 4 is a cross-sectional view of a flexible board including the internal
5 layer illustrated in Fig. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to Fig. 1, a flexible board in accordance with a preferred
embodiment is designed to have a three-layered structure including an internal
10 layer 2, a first ground layer 1 covering an upper surface of the internal layer 2
therewith, and a second ground layer 3 covering a lower surface of the internal
layer 2 therewith. A bus line and a clock line are arranged in the internal layer 2.
These bus line and clock line radiates unnecessary radiation a lot.

The three-layered flexible board illustrated in Fig. 1 is sandwiched with
15 electrically insulating first and second cover layers 4a and 4b, as illustrated in Fig.
2. Specifically, the first cover layer 4a covers a surface of the first ground layer 1
therewith, and the second cover layer 4b covers a surface of the second ground
layer 4b therewith.

The internal layer 2, the first and second ground layers 1 and 3, and the
20 first and second cover layers 4a and 4b are adhered to one another through
electrically insulating adhesive layers 5 sandwiched between the adjacent layers.

A plurality of through-holes 6 is formed throughout the first ground
layer 1, the internal layer 2, the said second ground layer 3.

Hereinbelow is explained an operation of the flexible board in
25 accordance with the embodiment. That is, the flexible board in accordance with
the embodiment prevents radiation of unnecessary radiation therefrom and
entrance of unnecessary radiation thereinto.

Fig. 3 is a plan view of the internal layer 2 on which a plurality of bus
lines 7 is arranged. In Fig. 3, the bus lines 7 are indicated as #2 to #9. Ground

lines 8 are arranged at opposite sides of the bus lines 7. In Fig. 3, the ground lines are indicated as #1 and #10. The ground lines 8 are formed with a plurality of through-holes 6.

Insulating layers 9 are formed between the ground lines 8 and the bus lines 7, and further between the adjacent bus lines 7 in order to electrically insulate them from one another.

As illustrated in Fig. 4, the internal layer 2 is sandwiched between the first and second ground layers 1 and 3. Thus, the bus lines 7 are surrounded by the first ground layer 1, the second ground layer 3, and the ground lines 8. The first ground layer 1, the second ground layer 3, and the ground lines 8 cooperate with each other to thereby establish a shield by which unnecessary radiation is prevented from being radiated outside of the bus lines 7.

The first ground layer 1, the second ground layer 3, and the ground lines 8 are electrically connected to one another through a plurality of the through-holes 6. The through-holes 6 make the first ground layer 1, the second ground layer 3, and the ground lines 8 act as common ground.

The shield established by the first ground layer 1, the second ground layer 3, and the ground lines 8 can be strengthened by much more stabilizing the first ground layer 1, the second ground layer 3, and the ground lines 8. For instance, the ground lines 8 may be formed in a larger area in order to enhance stability of the first ground layer 1, the second ground layer 3, and the ground lines 8. In such a case, it is preferable to increase the number of the through-holes 6 to thereby increase the common ground defined by the first ground layer 1, the second ground layer 3, and the ground lines 8.

By enhancing stability of the first and second ground layers 1 and 3 and the ground lines 8, they are protected from being influenced by the bus lines 7. As a result, unnecessary radiation is radiated out of the first and second ground layers 1 and 3 and the ground lines 8 to a less degree.

As mentioned so far, in accordance with the embodiment, the bus lines 7

formed on the internal layer 2 are surrounded by the ground lines 8 and the first and second ground layers 1 and 3. Hence, unnecessary radiation is prevented from being radiated out of the bus lines 7 by shield effect provided by the ground lines 8 and the first and second ground layers 1 and 3.

5 The three-layered flexible board 10 including the internal layer 2 and the first and second ground layers 1 and 3 has flexibility, and allows to form a three-dimensional wiring. Hence, it is possible to incorporate the flexible board 10 into a body of a cellular phone having a lot of limitations with respect to a space, ensuring a smaller and thinner cellular phone.

10 Though the bus lines 7 are formed on the internal layer 2 in the above-mentioned embodiment, the above-mentioned shield effect provided by the ground lines 8 and the first and second ground layers 1 and 3 can be obtained when clock lines are formed on the internal layer 2.

15 In addition, the shield effect prevents unnecessary radiation from entering the flexible board 10, it is also possible to form a line on the internal layer 2 which line is likely to be harmfully influenced by unnecessary radiation.

20 While the present invention has been described in connection with certain preferred embodiments, it is to be understood that the subject matter encompassed by way of the present invention is not to be limited to those specific embodiments. On the contrary, it is intended for the subject matter of the invention to include all alternatives, modifications and equivalents as can be included within the spirit and scope of the following claims.

25 The entire disclosure of Japanese Patent Application No. 10-347972 filed on November 24, 1998 including specification, claims, drawings and summary is incorporated herein by reference in its entirety.

WHAT IS CLAIMED IS:

1. A flexible board comprising:

(a) an internal layer;

5 (b) a line formed in a first area of said internal layer, said line radiating unnecessary radiation;

(c) a first ground layer formed on an upper surface of said internal layer, said first ground layer disallowing radiation to pass therethrough; and

10 (d) a second ground layer formed a lower surface of said internal layer, said second ground layer disallowing radiation to pass therethrough.

2. The flexible board as set forth in claim 1, further comprising:

(e) a first cover layer formed over a surface of said first ground layer; and

15 (f) a second cover layer formed over a surface of said second ground layer.

3. The flexible board as set forth in claim 2, further comprising electrically insulating adhesive layers sandwiched among said internal layer, said first and second ground layers, and said first and second cover layers.

20 4. The flexible board as set forth in claim 1, further comprising a ground line formed in a second area except said first area in said internal layer.

25 5. The flexible board as set forth in claim 1, wherein a plurality of through-holes is formed throughout said first ground layer, said internal layer, and said second ground layer.

6. The flexible board as set forth in claim 4, wherein a plurality of through-holes is formed throughout said first ground layer, said ground line, and said second ground layer, said through-holes electrically connecting said first ground

layer, said ground line, and said second ground layer to one another.

7. A method of fabricating a flexible board, comprising the steps of:

5 (a) forming a line in a first area of an internal layer, said line radiating unnecessary radiation;

(b) covering an upper surface of said internal layer with a first ground layer which disallows radiation to pass therethrough; and

(c) covering a lower surface of said internal layer with a second ground layer which disallows radiation to pass therethrough.

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8. The method as set forth in claim 7, further comprising the steps of:

(d) covering a surface of said first ground layer with a first cover layer; and

(e) covering a surface of said second ground layer with a second cover layer.

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9. The method as set forth in claim 8, further comprising the step of forming electrically insulating adhesive layers among said internal layer, said first and second ground layers, and said first and second cover layers.

20

10. The method as set forth in claim 7, further comprising the step of forming a ground line in a second area except said first area in said internal layer.

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11. The method as set forth in claim 7, further comprising the step of forming a plurality of through-holes throughout said first ground layer, said internal layer, and said second ground layer.

12. The method as set forth in claim 10, further comprising the step of forming a plurality of through-holes throughout said first ground layer, said ground line, and said second ground layer so that said through-holes electrically connect said first ground layer, said ground line, and said second ground layer to

one another.

13. A cellular phone including a flexible board,
said flexible board comprising:

- 5 (a) an internal layer;
- (b) a line formed in a first area of said internal layer, said line radiating unnecessary radiation;
- (c) a first ground layer formed on an upper surface of said internal layer, said first ground layer disallowing radiation to pass therethrough; and
- 10 (d) a second ground layer formed a lower surface of said internal layer, said second ground layer disallowing radiation to pass therethrough.

14. The cellular phone as set forth in claim 13, further comprising:

- (e) a first cover layer formed over a surface of said first ground layer; and
- 15 (f) a second cover layer formed over a surface of said second ground layer.

15. The cellular phone as set forth in claim 14, further comprising electrically insulating adhesive layers sandwiched among said internal layer, said first and second ground layers, and said first and second cover layers.

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16. The cellular phone as set forth in claim 13, further comprising a ground line formed in a second area except said first area in said internal layer.

17. The cellular phone as set forth in claim 13, wherein a plurality of through-holes is formed throughout said first ground layer, said internal layer, and said second ground layer.

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18. The cellular phone as set forth in claim 16, wherein a plurality of through-holes is formed throughout said first ground layer, said ground line, and

said second ground layer, said through-holes electrically connecting said first ground layer, said ground line, and said second ground layer to one another.

ABSTRACT OF THE DISCLOSURE

There is provided a flexible board including (a) an internal layer, (b) a line formed in a first area of the internal layer, the line radiating unnecessary radiation, (c) a first ground layer formed on an upper surface of the internal layer, the first ground layer disallowing radiation to pass therethrough, and (d) a second ground layer formed a lower surface of the internal layer, the second ground layer disallowing radiation to pass therethrough. The flexible board prevents unnecessary radiation from outwardly radiating without an increase in a size thereof.

FIG. 1

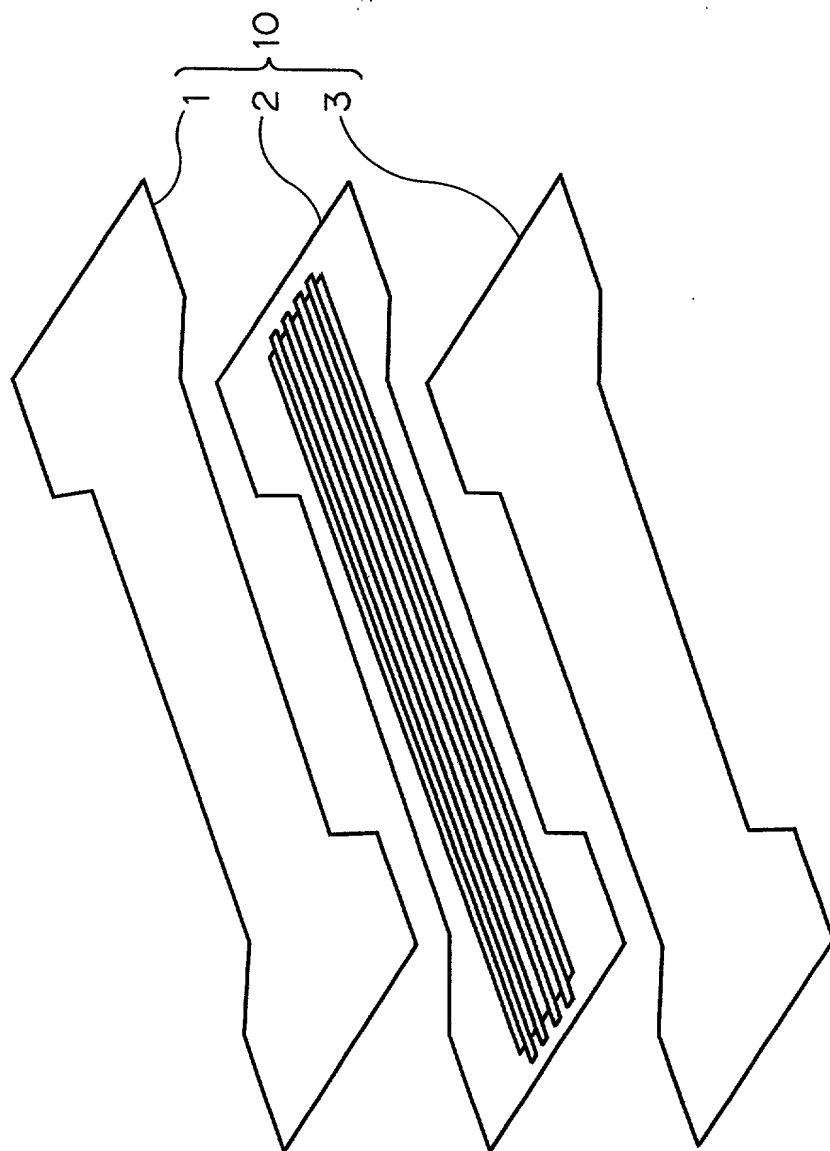


FIG. 2

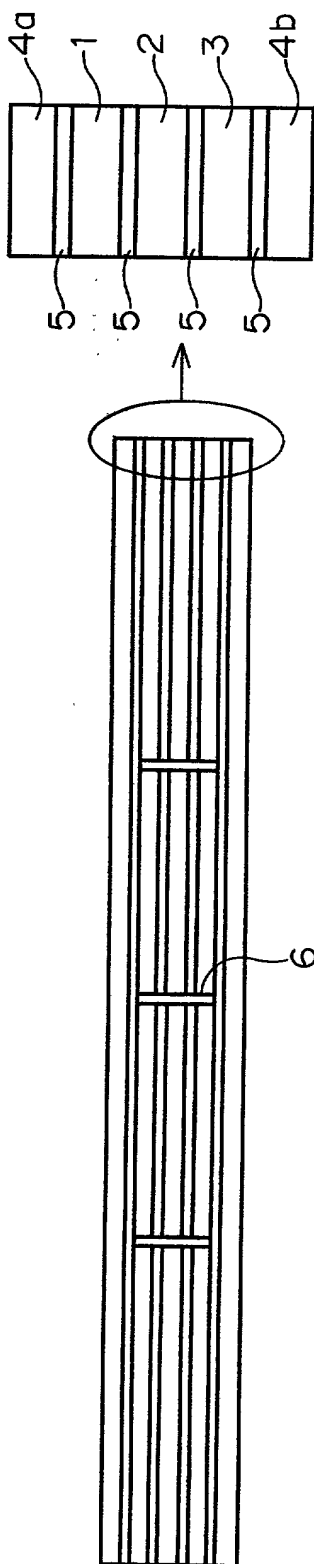


FIG. 3

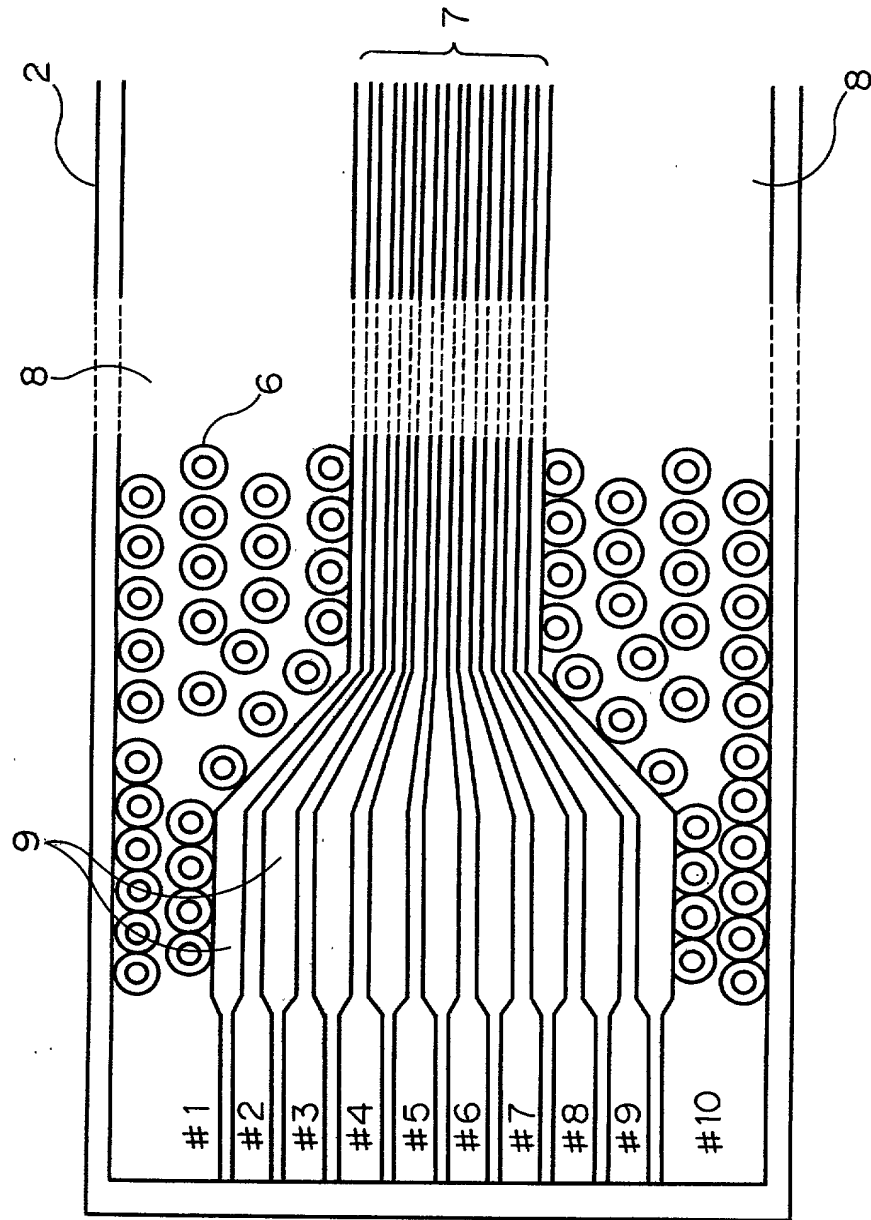
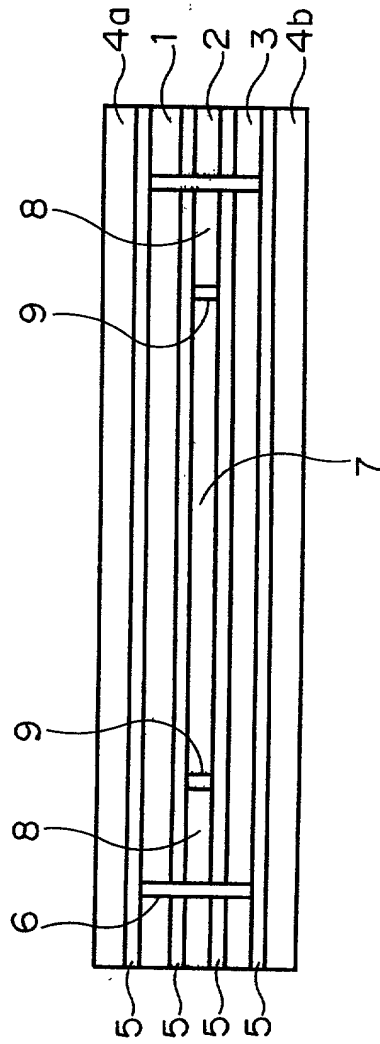


FIG. 4



Docket No.

13167

Declaration and Power of Attorney For Patent Application**English Language Declaration**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

FLEXIBLE BOARD AND METHOD OF FABRICATING THE SAME

the specification of which

(check one)

☒ is attached hereto.

☐ was filed on _____ as United States Application No. or PCT International Application Number _____

and was amended on _____

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

<u>10-347972</u>	<u>Japan</u>	<u>24/11/1998</u>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	
<u> </u>	<u> </u>	<u> </u>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	
<u> </u>	<u> </u>	<u> </u>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

Stephen D. Murphy, Reg. No.: 22,002

Paul J. Esatto, Reg. No.: 30,749

William C. Roch, Reg. No.: 24,972


Mark J. Cohen, Reg. No.: 32,211

Frank S. DiGiglio, Reg. No.: 31,346

Donald T. Black, Reg. No.: 27,999

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Garden City, New York 11530

Direct Telephone Calls to: *(name and telephone number)*
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Full name of sole or first inventor YOSHIMASA HOSONUMA	
Sole or first inventor's signature <i>Yoshimasa Hosonuma</i> 	Date Nov. 4 1999
Residence Tokyo, Japan	
Citizenship Japan	
Post Office Address c/o NEC Corporation, 7-1, Shiba 5-chome, Minato-ku, Tokyo, Japan	

Full name of second inventor, if any	
Second inventor's signature	Date
Residence	
Citizenship	
Post Office Address	